

(No Model.)

2 Sheets—Sheet 1.

F. WÜRTEMBERGER.

Blast Apparatus for Treating Iron in Reverberatory
or other Furnaces.

No. 238,628.

Patented March 8, 1881.

Fig. 1.

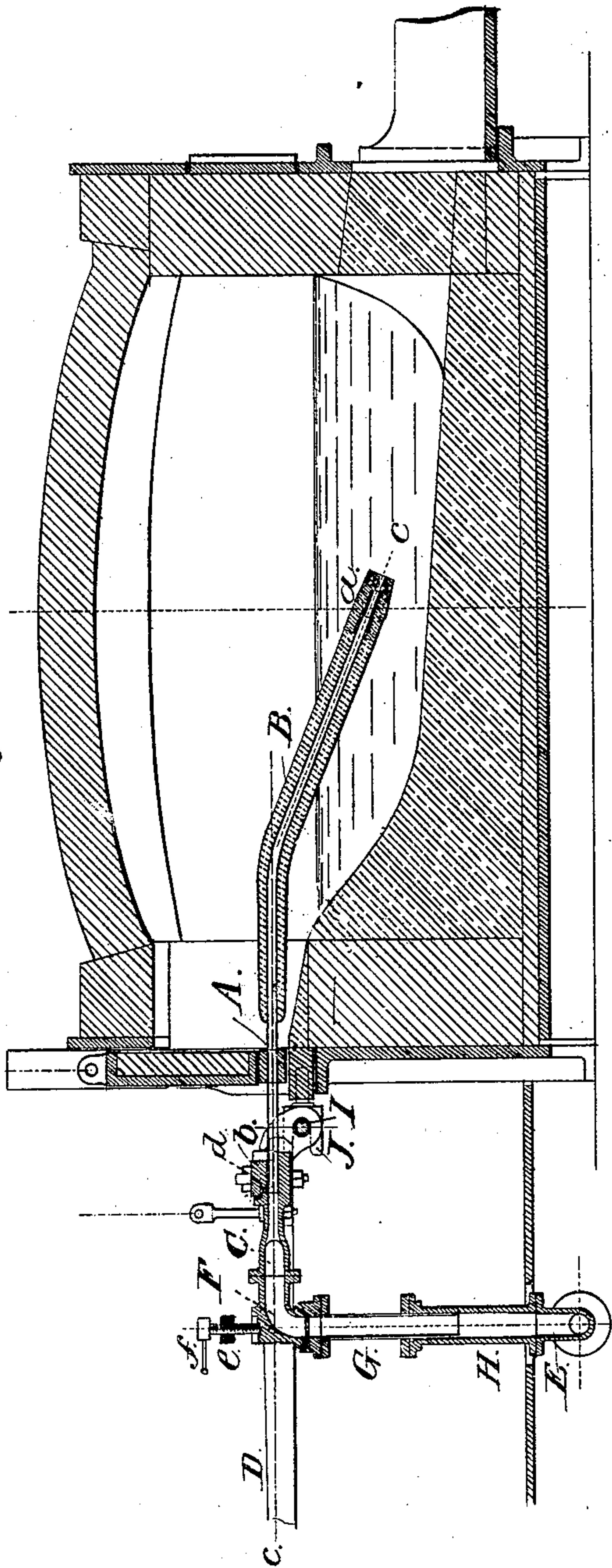
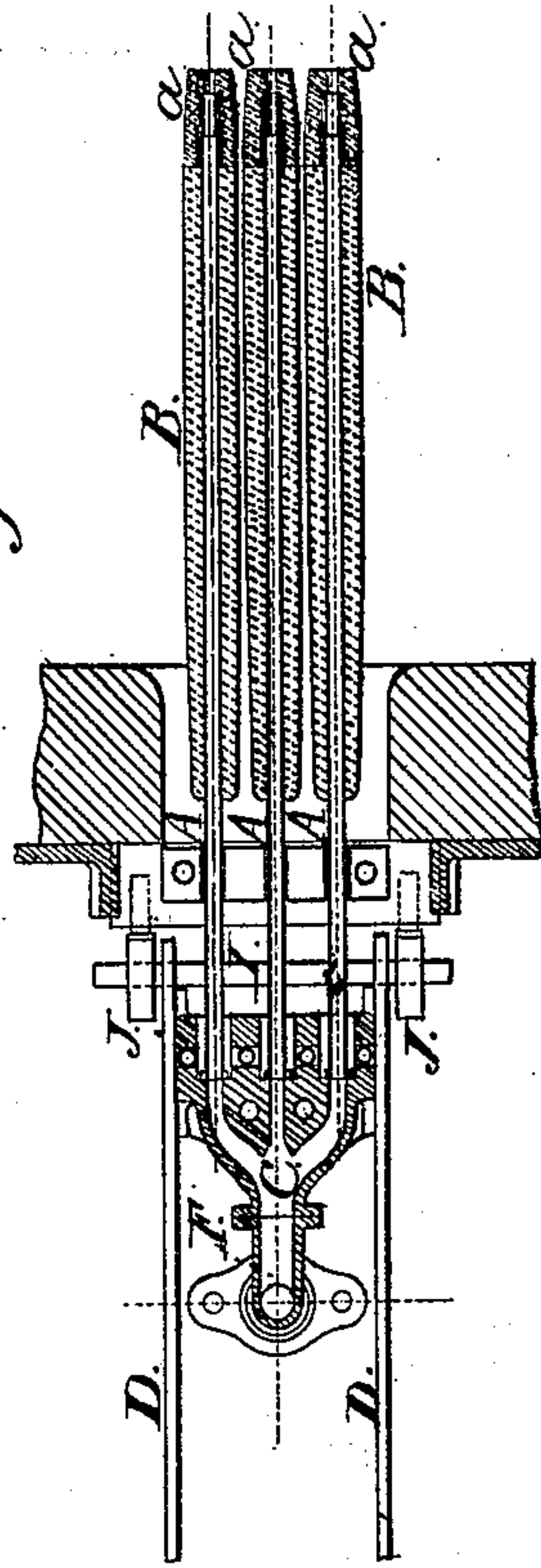


Fig. 2.



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Willy C. Schultz.
John C. Tunbridge

Inventor:

F. Würtenberger
by his attorney
A. B. Bensen

(No Model.)

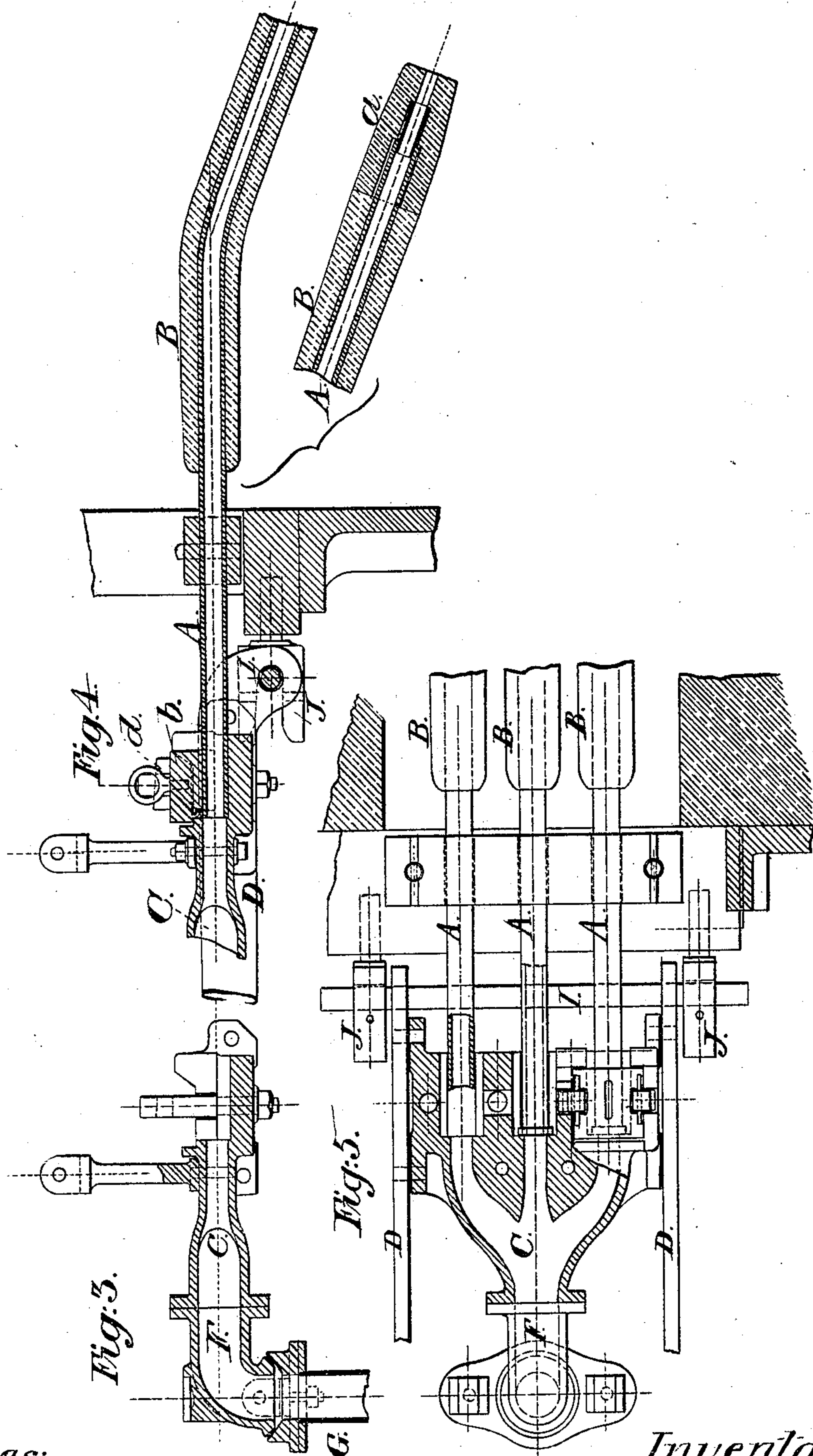
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UNITED STATES PATENT OFFICE.

FRANZ WÜRTENBERGER, OF RUHRORT, PRUSSIA, GERMANY.

BLAST APPARATUS FOR TREATING IRON IN REVERBERATORY OR OTHER FURNACES.

SPECIFICATION forming part of Letters Patent No. 238,628, dated March 8, 1881.

Application filed March 27, 1880. (No model.) Patented in Germany May 27, 1879.

To all whom it may concern:

Be it known that I, FRANZ WÜRTENBERGER, of Ruhrort, in the Kingdom of Prussia and German Empire, have invented a new and Improved Blast Apparatus for Treating Iron in a Reverberatory or other Furnace, of which the following is a specification, and for which I have received German Letters Patent for fifteen years, dated April 27, 1879, numbered 10,815.

This invention relates to an improvement in the manufacture of large quantities of steel or ingot iron, in regenerative or other reverberatory furnaces, by blowing air into the bath of metal by means of a tuyere apparatus of peculiar construction, capable of being introduced separately into the furnace and into the bath of metal. White or mottled pig-iron is to be used chiefly, but grey pig may be employed also. Any quantity of steel-scrap or iron-scrap may be mixed with the pig-iron, and this method of working may therefore be also used in the Martin or open-hearth process as now practiced, offering many advantages, because it enables the use of a considerably greater quantity of pig-iron, accelerates the process, increases the production, and makes the product more homogeneous.

The process is carried out by introducing one or a number of the described tuyere apparatus into the bath of metal in the reverberatory or regenerative furnace, the bath consisting of pig-iron alone taken from a blast-furnace or a cupola, or obtained by melting down in the reverberatory furnace either pig-iron alone or a mixture of pig-iron with steel or iron. The air blown in by means of the tuyere apparatus causes a rapid elimination of the silicon, carbon, &c., in the bath of metal. The decarbonization is carried to the point necessary in order to obtain the product desired, and then the quality aimed at is produced, according to estimation, by the addition of spiegeleisen, ferromanganese, &c.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section of a furnace, and the apparatus in position; Fig. 2, a horizontal section of the apparatus taken on line *c c* of Fig. 1. Figs. 3 and 4 are vertical sectional views of the apparatus and a part of the furnace, on an enlarged scale, showing the

construction in detail; and Fig. 5 is an enlarged horizontal sectional view of the apparatus and a part of the furnace.

The tuyere apparatus which serves to carry out this process consists, as shown by the drawings, of three (more or less) wrought-iron tubes, A, coated with refractory material B, and carrying on the ends, dipping into the bath of metal, a fire-proof nozzle, *a*. The outer end, which it is best to provide with a small flange, is nicely fitted into a movable cast-iron distributor, C, and is fastened, by means of a cover, *b*, and a wedge, *d*, or otherwise, in such manner that the tubes are intimately connected with the distributor, so that the entire apparatus may be guided by two handles, D D.

The method of attaching the tubes or tuyeres, and the method of constructing the distributor, &c., may also be effected by other simple means.

The apparatus may consist of one single or of two or more tubes or tuyeres. The nozzle may be of different shape, and may possess one or more openings for the passage of the blast.

The tubes dip into the bath of metal in a furnace to a requisite depth, as shown in Fig. 1, and corresponding pressure of blast must be provided for. (The pressure is generally about seven and one-half pounds per square inch above atmospheric pressure.) If one nozzle or one tube has become defective during the blow it can be exchanged at once.

The joint between the apparatus and the blast-pipe E is a small elbow-pipe, F, attached to the distributor C, a firm and blast-tight connection between the said elbow-pipe and a vertically-movable section of pipe, G, and between said vertically-movable pipe and a blast-supply pipe, H, which is capable of turning, being made by means of a frame and screw, *e f*. The turning pipe and the vertically-movable section follow the movement of the apparatus when the tubes or tuyeres are made to dip into or out of the bath of metal. This connection with the blast-pipe may be effected by other means.

The two handles *d* of the apparatus terminate in a frame, I, which, when the apparatus is introduced into the furnace, bears with pivotal connections in two forked holders, J J, which are screwed into the working plate. This affords the apparatus a pivoting point, which

materially facilitates its manipulation. It is best to suspend the apparatus from an overhead track. It may, however be adjusted by other means.

5 It is evident that this tuyere apparatus, besides carrying out the processes mentioned in the above, in which dephosphorization is not necessary, is also the means for working the well-known Thomas and Gilchrist dephosphorizing process in stationary reverberatory or gas-generative furnaces. The bath of metal may in this case be either pig-iron alone or a smelted mixture of pig-iron with phosphoric steel or iron scrap. The apparatus furthermore permits 15 the blowing of finely-powdered reagents into the bath of metal for the purpose of dephosphorizing pig-iron as well as steel, it being possible to blow powdered oxides—*i. e.*, oxides of iron, oxides of manganese, lime, and magnesia, or a mixture of them, these oxides causing the oxidation and the slagging of the phosphorus—by means of the blast into the bath of metal. This method of dephosphorization may also be used for dephosphorizing pig-iron by 25 allowing the pig-iron to flow from the blast-furnace into a receptacle provided with the movable tuyeres, and by which a certain quantity of these oxides is supplied. By means of a valve the quantities of these reagents conducted to the apparatus can be easily regulated. 30

Dephosphorization in the gas-regenerative furnace may also be effected in connection with the Bessemer process by bringing the charge from an ordinary Bessemer converter, (where

phosphoric pig-iron is blown until carbon and silicon are eliminated,) but without the cinder 35 into the regenerative furnace, and then carrying out the dephosphorization by means of the tuyere apparatus above described.

For certain purposes steam or gases may be 40 blown into the bath of metal by means of the apparatus instead of air, and the blowing of reagents may also be effected by means of steam or compressed gases.

I claim—

1. In combination with the distributor C, interposed between a blast-pipe and one or more 45 tuyere-pipes, the handles D D, frame I, and holders J J, attached to the furnace for the purpose of giving a pivotal support for the said distributor C and its connected parts, on 50 which they can be turned so as to elevate and depress the nozzle of the tuyere-pipes when placed in the furnace, substantially as described. 55

2. In combination with the distributor C and the tuyere-pipes supported on the holders J and the blast E, the elbow F, adjustable pipe G, and pivoted pipe H, to permit the tuyere-pipes to be elevated and depressed without 60 breaking their connection with the blast, substantially as described.

This specification signed by me this 28th day of January, 1880.

FRANZ WÜRTENBERGER.

Witnesses:

HOEVELEY,
V. KRÄWITZ.